CZARA Onsite Wastewater Treatment Inspection Program Management Measure

Onsite System Failure Rates

- 1990 Census Bureau Report 10%
- Massachusetts (Inspections) 20%
- Rouge River study* 72%
  (13 homes)

*(National data is incomplete;
Failure definitions vary, but include
sewage surfacing, backups, water
contamination)*

**Larger study indicates lower failure rate*

Failure analysis: types of failure and effects

Table 5-9. Common onsite wastewater treatment system failures

Type of failure	Evidence of failure
Hydraulic failure	Untreated or partially treated sewage pooling on ground surfaces, sewage backup in plumbing fixtures, sewage breakouts on hill slopes
Pollutant contamination of ground water	High nitrate levels in drinking water wells; taste or odor problems (e.g., sulfur, household cleaners) in well water caused by untreated, poorly treated, or partially treated wastewater; presence of toxics (e.g., solvents, cleaners) in well water
Microbial contamination of ground and surface water	Shellfish bed bacterial contamination, recreational beach closures due high bacterial levels, contamination of drinking water wells with fecal bacteria or other fecal indicators
Nutrient contamination of surface water	Algal blooms, high aquatic plant productivity, low dissolved oxygen concentrations

Bad Management Leads to Failure

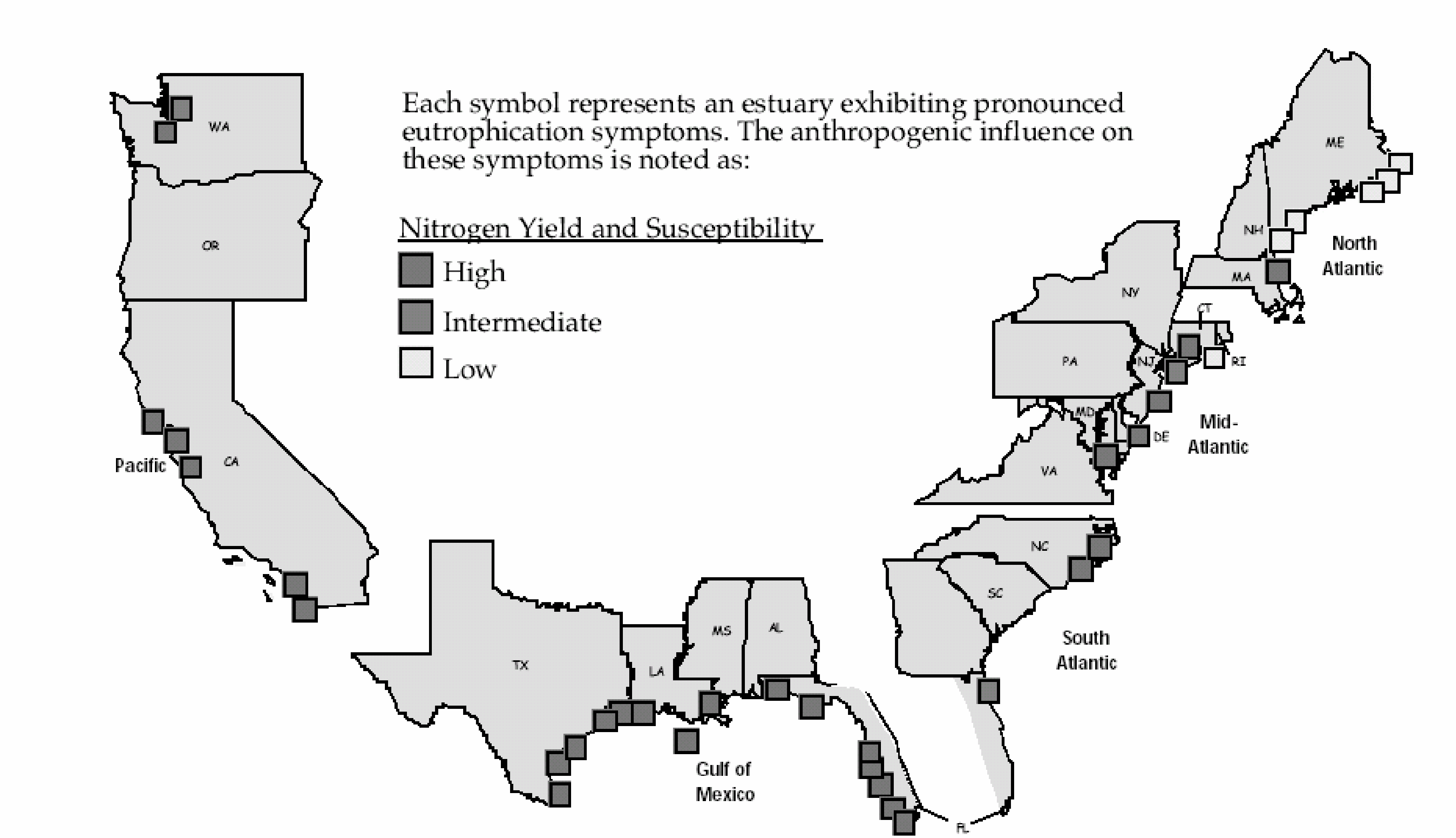
- Failure to Inspect
- Failure to Maintain
- Poor Design / Improper Siting
- Poor Installation
- Do not plan for Cumulative Impacts of Multiple Systems e.g. Nitrogen

Poor Design/Siting: Low Depth to SHWT (Separation Distance)

- Contamination of groundwater & surface water
  - Disease-causing bacteria
  - Nitrates (DW MCL = 10 mg/l)
  - Nutrients (e.g., nitrogen and phosphorus)
- Groundwater mounding
  - Intrusion into OWTS trenches
  - Treatment processes compromised
  - Plumbing and other failures (e.g., breakouts)

Cumulative Contribution Potential

Figure 9. Estuaries exhibiting anthropogenic eutrophication effects



Source: NOAA, 1998

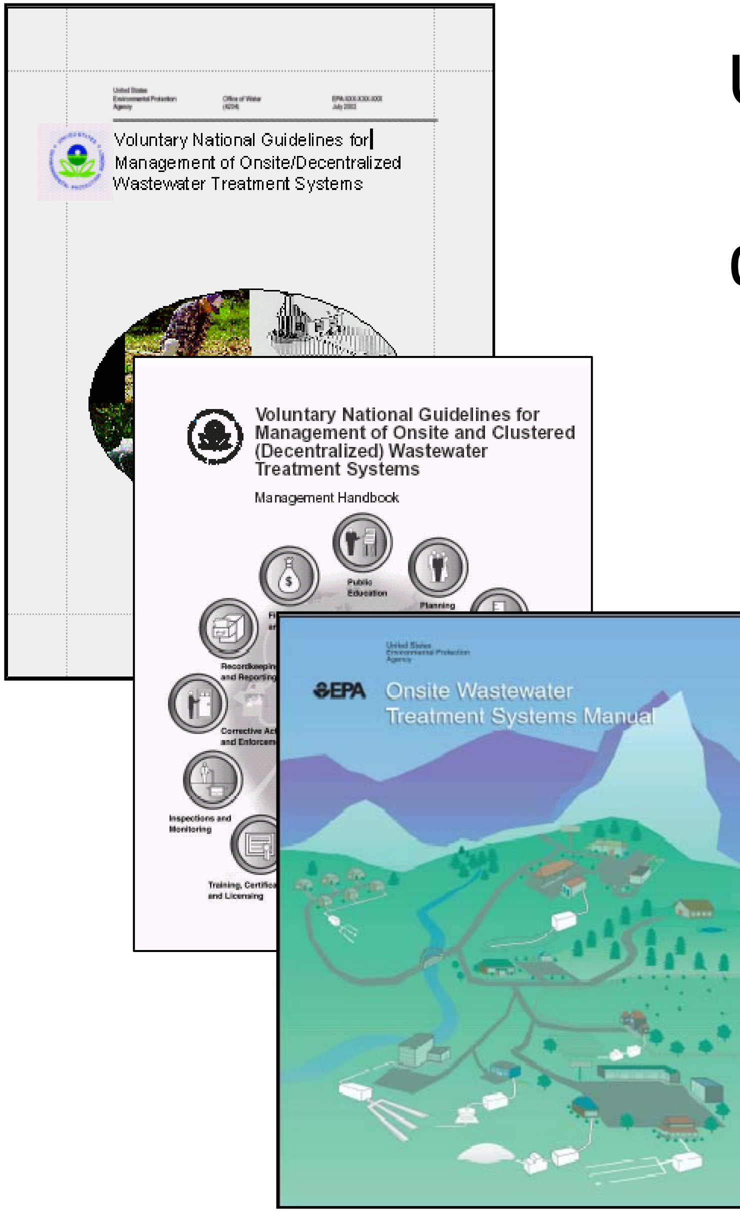
Operating OSDS Management Measures for Inspections

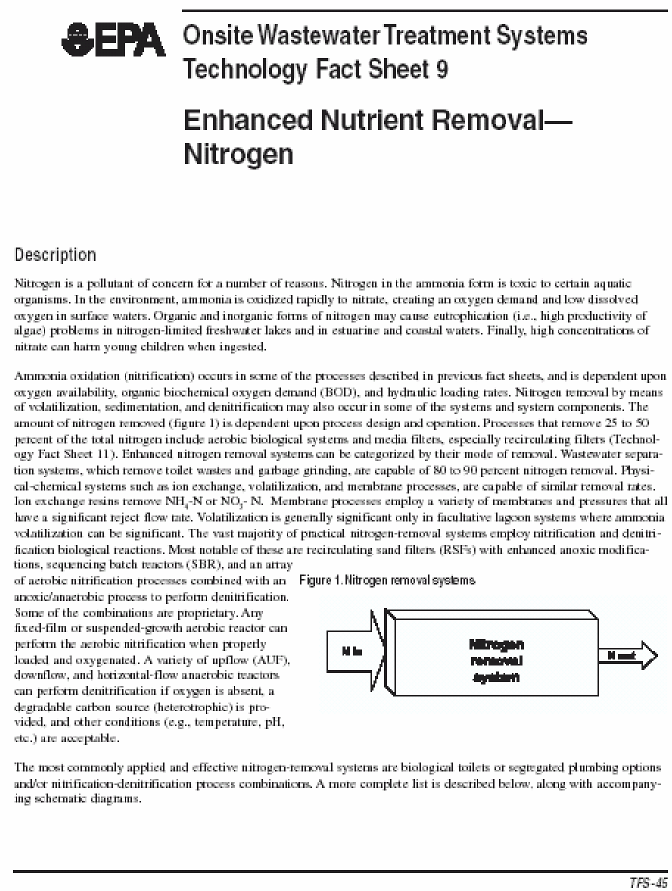
- Inspect OSDS at a frequency adequate to ascertain whether OSDS are failing.

Inspections of existing OSDS

- Any combination of programs that result in 90-100% of OSDS in Coastal area inspections over 15 to 20 year period. Resource commitment required.
- Inspections do not require monitoring, just a site visit.
- Certified inspectors preferred, but will accept trained homeowners, pumper certifications as inspections.
- Will accept requirements to inspect at change of ownership, by state code or if major mortgagers require.

US EPA resources are available for onsite system planning, design, operation, maintenance, and management





EPA

Onsite Wastewater Treatment Systems Technology Fact Sheet 9

Enhanced Nutrient Removal—Nitrogen

Description

Nitrogen is a pollutant of concern for a number of reasons. Nitrogen in the ammonia form is toxic to certain aquatic organisms. In the environment, ammonia is oxidized rapidly to nitrate, creating an oxygen demand and low dissolved oxygen in surface waters. Organic and inorganic forms of nitrogen may cause eutrophication (i.e., high productivity of algae) problems in nitrogen-limited freshwater lakes and in estuarine and coastal waters. Finally, high concentrations of nitrate can harm young children when ingested.

Ammonia oxidation (nitrification) occurs in some of the processes described in previous fact sheets, and is dependent upon oxygen availability, organic biochemical oxygen demand (BOD), and hydraulic loading rates. Nitrogen removal by means of volatilization, sedimentation, and denitrification may also occur in some of the systems and system components. The amount of nitrogen removed (figure 1) is dependent upon process design and operation. Processes that remove 25 to 50 percent of the total nitrogen include aerobic biological systems and media filters, especially recirculating filters (Technology Fact Sheet 11). Enhanced nitrogen removal systems can be categorized by their mode of removal. Wastewater separation systems, which remove toilet wastes and garbage grinding, are capable of 80 to 90 percent nitrogen removal. Physical-chemical systems such as ion exchange, volatilization, and membrane processes, are capable of similar removal rates. Ion exchange resins remove NH_4-N or NO_3- N. Membrane processes employ a variety of membranes and pressures that all have a significant reject flow rate. Volatilization is generally significant only in facultative lagoon systems where ammonia volatilization can be significant. The vast majority of practical nitrogen-removal systems employ nitrification and denitrification biological reactions. Most notable of these are recirculating sand filters (RSFs) with enhanced anoxic modifications, sequencing batch reactors (SBR), and an array of aerobic nitrification processes combined with an anoxic/anaerobic process to perform denitrification. Some of the combinations are proprietary. Any fixed-film or suspended-growth aerobic reactor can perform the aerobic nitrification when properly loaded and oxygenated. A variety of upflow (AUF), downflow, and horizontal-flow anaerobic reactors can perform denitrification if oxygen is absent, a degradable carbon source (heterotrophic) is provided, and other conditions (e.g., temperature, pH, etc.) are acceptable.

Figure 1. Nitrogen removal systems

The most commonly applied and effective nitrogen-removal systems are biological toilets or segregated plumbing options and/or nitrification-denitrification process combinations. A more complete list is described below, along with accompanying schematic diagrams.

TWIST Inventory and Tracking Data Base

- Developed for use in identifying locations, pump out frequency, **inspections and results**
- Basic information
- Free
- Microsoft Access: Can customize with software changes
- Available through Decentralized Program

EPA Web Site

epa.gov/owm/septic

Clean Water
starts at
Home